What is claimed is:

1. A magnetic recording medium comprising:

a substrate; and

a plurality of spaced-apart magnetic islands on the substrate, each island comprising at least two stacked magnetic cells, each cell having perpendicular magnetic anisotropy and being separated from the other cells in its island.

2. The medium of claim 1 wherein the magnetic moments of each of two neighboring cells in an island are oriented either parallel or antiparallel.

3. The medium of claim 1 wherein each cell is a single magnetic domain.

4. The medium of claim 3 wherein each cell has a magnetic moment oriented in one of two opposite directions substantially perpendicular to the substrate.

5. The medium of claim 1 wherein each island includes a layer of nonmagnetic material between the stacked cells for separating the cells.

6. The medium of claim 1 wherein the islands are spaced apart by voids.

7. The medium of claim 6 wherein the substrate is patterned into a plurality of pillars and wherein the islands are formed on the pillars.

8. The medium of claim 1 wherein the islands are spaced apart by spacing material formed on the substrate between the islands and having substantially no perpendicular magnetic anisotropy.

9. The medium of claim 8 wherein the spacing material is nonmagnetic.

10. The medium of claim 1 wherein there are only two cells in each island.

11. The medium of claim 1 wherein each cell is a multilayer of alternating layers of a first material selected from the group consisting of Co and Fe and a second material selected from the group consisting of Pt and Pd, said multilayer having magnetic anisotropy substantially perpendicular to the substrate.

12. The medium of claim 1 wherein each cell is formed of a ferromagnetic material comprising one or more of Co, Ni, Fe and alloys thereof.

13. The medium of claim 12 wherein each cell is formed of a ferromagnetic material comprising an alloy of Co and Cr having a magnetocrystalline anisotropy substantially perpendicular to the substrate.

14. The medium of claim 13 wherein each cell is formed directly on a growth enhancing sublayer.

15. The medium of claim 14 wherein the growth enhancing sublayer is formed of a material selected from the group consisting of Ti, TiCr, C, NiAl, SiO_2 and CoCr, where Cr is about 35-40 atomic percent in the CoCr sublayer.

16. The medium of claim 1 wherein the cell closest to the substrate in each island has a magnetic coercivity greater than the magnetic coercivity of the other cells in its island.

17. The medium of claim 1 further comprising an underlayer on the substrate beneath the islands.

18. The medium of claim 17 wherein the underlayer is a soft magnetically permeable underlayer of material selected from the group consisting of NiFe, FeAlSi, FeTaN, FeN, CoFeB and CoZrNb.

19. The medium of claim 1 wherein the islands are arranged on the substrate in a plurality of generally concentric circular tracks.

20. The medium of claim 1 wherein the islands are arranged on the substrate in an array of mutually perpendicular rows.

21. A patterned magnetic recording medium comprising a substrate and a plurality of spaced-apart magnetic islands on the substrate, each island comprising at least two stacked magnetic cells, each cell having (a) magnetic anisotropy substantially perpendicular to the substrate, (b) a magnetic moment substantially decoupled from the magnetic moments of neighboring cells in its island, and (c) a magnetic coercivity different from the coercivities of neighboring cells in its island.

22. The medium of claim 21 wherein each island further comprises a spacer layer between neighboring cells for decoupling the magnetic moments of neighboring cells.

23. The medium of claim 21 wherein the islands are spaced apart by voids.

24. The medium of claim 23 wherein the substrate is patterned into a plurality of pillars and wherein the islands are formed on the pillars.

25. The medium of claim 21 wherein the islands are spaced apart by spacing material formed on the substrate between the islands and having substantially no perpendicular magnetic anisotropy.

26. The medium of claim 25 wherein the spacing material is nonmagnetic.

27. The medium of claim 21 wherein there are only two cells in each island.

28. The medium of claim 21 wherein each cell is a multilayer of alternating layers of a first material selected from the group consisting of Co and Fe and a second material selected from the group consisting of Pt and Pd, said multilayer having magnetic anisotropy substantially perpendicular to the substrate.

29. The medium of claim 21 wherein each cell is formed of a ferromagnetic material comprising one or more of Co, Ni, Fe and alloys thereof.

30. The medium of claim 29 wherein each cell is formed of a ferromagnetic material comprising an alloy of Co and Cr having magnetocrystalline anisotropy substantially perpendicular to the substrate.

31. The medium of claim 30 wherein each cell is formed directly on a growth enhancing sublayer.

32. The medium of claim 31 wherein the growth enhancing sublayer is formed of a material selected from the group consisting of Ti, TiCr, C, NiAl, SiO_2 and CoCr, where Cr is about 35-40 atomic percent in the CoCr sublayer.

33. The medium of claim 21 further comprising an underlayer on the substrate beneath the islands.

34. The medium of claim 21 wherein the underlayer is a soft magnetically permeable underlayer of material selected from the group consisting of NiFe, FeAlSi, FeTaN, FeN, CoFeB and CoZrNb.

35. The medium of claim 21 wherein the medium is a disk and the islands are arranged on the substrate in a plurality of generally concentric circular tracks.

36. The medium of claim 21 wherein the islands are arranged on the substrate in an array of mutually perpendicular rows.